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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,800	09/10/2003	Gert-Jan Heerens	081468-0305844	1816
909	7590	12/11/2006	EXAMINER	
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P.O. BOX 10500				
MCLEAN, VA 22102			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 12/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/658,800

Applicant(s)

HEERENS, GERT-JAN

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 5,7-10 and 13-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,11 and 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :9/10/03,3/30/04,4/18/06,7/14/06.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of Group I, claims 1-14 and species, referred to in claim 3 in the reply filed on October 4, 2006 is acknowledged. The traversal of restriction between Group I and Group III is on the ground(s) that there is no serious burden to search and examine independent claims 1 and 19 since both claims 1 and 19 encompass a cleaning mechanism or process involving reducing a gas pressure of a sealed chamber. This is not found persuasive because : a) the groups are classified in different classes; b) the method is not disclosed to be performed in the claimed apparatus; c) the searches of claimed method and claimed apparatus are not coextensive for at least being in different classes and for the reason that in the search for apparatus, the search is for the **structural elements** of the apparatus, in the search for the method the search is for the **steps** of the method.

2. The traversal related to election of species is on the ground(s) that allegedly Examiner indicated species as claims, and not as embodiments of the invention. This is not found persuasive because:

Examiner did not identified species as claims, as alleged, but rather referred to the claims readable on the species. The species are "handling the gas pressure", i.e. either a) cycling or b) increasing pressure prior to reducing it. The species also are " handling the object", i.e. either a1) charging the surface of the object or b1) vibrating the object or c1) changing the temperature of the object or d1) bombarding the surface of the object

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or e1) applying a liquid layer to the object. The species are patentably distinct because they do not overlap in scope, they are not disclosed as being capable of use together, and if searched together would have required the examiner to extend the search into different fields, and thus would have imposed additional burden on the examiner.

The requirement is still deemed proper and is therefore made **FINAL**.

3. Claims readable on the elected species as identified by Applicant are 1-4, 6 and 12. Examiner believes that claim 11 was also elected by Applicant as a method of handling the surface, since claim 12 depends on claim 11. Accordingly, claims **1-4, 6, 11 and 12 are examined on the merits.**

4. Claims 5, 7-10, 13-20 are withdrawn from consideration as being drawn to non-elected inventions/species.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

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3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 2, 11 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Boumerzoug et al (U.S. 6,764,385) in view of Masiano et al (U.S. 6,136,167).

With regard to claims 1 and 2, Boumerzoug discloses a method for cleaning semiconductor substrates to remove contaminant particles of polymeric residues from the photoresists, the process comprising placing a substrate into the cleaning chamber closing and sealing the chamber and applying one of or the mixture of cleaning gases under pressure controlled vacuum conditions (abstract, Fig.1, Fig. 8A, B, 9A,B, col.2, lines 15, 16; col.3, lines 40-50; col.5, lines 15-18; col.6, lines 2-6; col.134, lines 15-21, 45-47). Boumerzoug does not specifically teach that the pressure is reduced to  $10^{-2}$  mbar in less than 5 seconds.

It is first noted that limitation "in less than 5 seconds" is interpreted as including "no" time at all, which means that vacuum can be imposed from the very beginning of the

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process. With regard to the value of the pressure to which the chamber was vacuumed, first of all there is no criticality shown on this record of this specific value, and secondly it is well known in the art to perform semiconductor processing under the pressures that are **typical**, i.e. about  $10^{-2}$  torr ( $10^{-2}$  mbar =  $7.6 \times 10^{-3}$  torr). Thus, for example, U.S.

6,136,167 to Masiano teaches that after a preliminary cleaning of the substrate it is placed in the chamber, the chamber is sealed, and then vacuum is drawn by the pumping system and then the forechamber 1 can be filled with argon to a pressure for instance,  $10^{-1}$ . The chamber is then filled with argon to a typical pressure of  $10^{-2}$  torr.

Therefore, it would have been obvious to those skilled in the art to adjust the vacuum to a typically used pressures, because it is suggested by Boumerzoug that the process is performed in the pressure controlled vacuum. Furthermore, since the processing pressure/vacuum is result effective parameter, it can be optimized in order to achieve the more effective cleaning. Since the general conditions of the instant claim are met by Boumerzoug it is obvious to achieve optimum results via routine experimentation.

With regard to claim 2, the photoresist is a part of a lithographic mask.

With regard to claims 11 and 12, Boumerzoug teaches the cryogenic cleaning subsequently or simultaneously with the initial gas plasma cleaning (abstract). For such cryogenic cleaning the surface of the substrate is bombarded with condensed  $\text{CO}_2$  particles (Fig.10, 12, 13, col.12, lines 25-35).

9. Claims 3, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boumerzoug in view of Masiano, as applied to claim 1 above, and in further view of JP 07-096259.

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With regard to claims 3, 4 and 6, Boumerzoug/Masiano do not specifically teach increasing and decreasing pressure, i.e. pressure fluctuations as claimed.

JP'259 (Abstract) discloses a method for removal the particles from the surface of a substrate by providing a treatment tank, a means supplying specific gas to the surface of the substrate and a means generating **Bernoulli pressure difference** on the surface of the substrate. A silicon wafer 107 is inserted in a substrate receiving tank 130 and, after the atmosphere in the tank 130 is sufficiently replaced with gas, for example, N<sub>2</sub>, the silicon wafer 107 is fixed on the support stand 108 ***within a vacuum treatment tank*** 101 through a substrate feed chamber 131. Next, an opening and closing valve 113 is opened and the N<sub>2</sub> gas is sprayed on the silicon wafer 101 through a blow off port 111. Further, a gas control part 117 is operated to generate ***intermittent pressure fluctuations from the blow off port 111, for example, at a rate of 10 times/min.***

Since both JP'259 and Boumerzoug are concerned with removal of particulate matter from the surface of the substrates by blowing a gas over the surface, it would have been obvious to one skilled in the art to employ the pressure fluctuations as taught in JP'259 in the ***regulated*** vacuum system of Boumerzoug in order to better overcome Van-der-Waals forces between the particles, loosen attachment of the particles to the substrate and thus achieve better and faster removal.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. 2005/0217706 teaches fluid assisted cryogenic cleaning; US 3,420,710 teaches cleaning webs with sonic air blast using pressure differential;



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2005/0263170 teaches stripping resist and removing particles using pressure controlled vacuum.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mikhail Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1404. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Michael Kornakov  
Primary Examiner  
Art Unit 1746

12/06/2006